THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A method of performing a chemical reaction between reactants comprising:

(a) subjecting an emulsion comprising

(i) a discontinuous first phase in which at least one of the reactants is present; and

(ii) a substantially continuous second phase,

to a physical or chemical change such that a substantially continuous phase is formed from the discontinuous phase; and

(b) providing conditions in which the chemical reaction between the reactants takes place.

2. A method according to claim 1 wherein the discontinuous first phase is an aqueous phase.

3. A method according to claim 1 or claim 2 wherein the continuous second phase is an inert or an organic phase.

4. A method of performing a chemical reaction between reactants in an aqueous phase comprising:

(a) subjecting an emulsion comprising

(i) a discontinuous aqueous phase in which at least one of the reactants is present; and

(ii) a continuous inert phase,

to a physical or chemical change such that a substantially continuous aqueous phase is formed; and

(b) providing conditions in which the chemical reaction between the reactants takes place.

5. A method according to any one of claims 1 to 4 wherein the chemical reaction is a reaction selected from the group consisting of: DNA sequencing, Polymerase Chain Reaction (PCR), Rolling Circle Amplification (RCA), Ligase Chain Reaction (LCR), Rapid Amplification of cDNA Ends (RACE), reverse-transcriptase PCR (RT-PCR), DNA fingertyping, DNA genotyping, endonuclease-restriction digest, DNA ligation, DNA phosphorylation, DNA methylation, DNA labelling, ribonucleic acid (RNA) digestion, proteolytic digestion, and protein modification.

6. A method according to claim 5 wherein protein modification is glycosylation or phosphorylation.

7. A method according to claim 5 wherein the chemical reaction is DNA sequencing or PCR.

8. A method according to any one of claims 1 to 4 wherein the reactants are selected from the group consisting of: DNA, RNA, mRNA, proteins, enzymes, salts, radioactive isotopes and carbohydrates.

9. A method according to claim 8 wherein the DNA is gDNA, cDNA, mDNA, primer DNA, plasmid DNA or a PCR product.

10. A method according to claim 8 wherein the enzyme is a DNA polymerase, RNA polymerase, reverse transcriptase, restriction endonuclease, DNA methylase, polynucleotide kinase, nucleotide transferase, DNA ligase, RNA ligase, protease, or other DNA, RNA or protein modifying enzyme.

11. A method according to any one of claims 2 to 10 wherein the aqueous phase is in a submicrolitre or microlitre volume.

12. A method according to any one of claims 3 to 11 wherein the emulsion comprises a single inert phase and two or more different aqueous phases.

13. A method according to any one of claims 1 to 11 wherein the emulsion is prepared by combining a first and second emulsion wherein

(a) the first emulsion comprises a first aqueous phase and a first inert phase wherein the first aqueous phase comprises a first reactant; and

(b) the second emulsion comprises a second aqueous phase and a second inert phase wherein the second aqueous phase comprises a second reactant.

14. A method according to claim 13 wherein the first and second inert phases are the same but the first and second aqueous phases are different.

15. A method according to claim 13 wherein the first inert phase and the second inert phase are different.

16. A method according to any one of claims 3 to 15 wherein the inert phase is a non-polar water-immiscible compound or composition.

17. A method according to claim 16 wherein the inert phase is selected from the group consisting of: a hydrocarbon compound; a linear, branched or cyclic polysiloxane; a mineral or petroleum oil.

18. A method according to claim 17 wherein the hydrocarbon compound is selected from the group consisting of: pentane, hexane, heptane, octane, nonane, decane, dodecane, hexadecane, octadecane, eicosane, squalene and derivatives thereof.

19. A method according to claim 17 wherein the hydrocarbon is selected from the group consisting of: 7-methyl-1,6-octadiene or 2,2,4-trimethylpentane, 1-dodecene, 1-hexadecane, cyclohexane and propylcyclohexane.

20. A method according to any one of claims 3 to 12 wherein the inert phase is selected from the group consisting of: mineral oil, hexadecane, dodecane and n-hexane.

21. A method according to any one of claims 1 to 20 wherein the emulsion comprises a surfactant.

22. A method according to claim 21 wherein the surfactant is selected from the group of non-ionic surfactants consisting of: APO-10, APO-12, BRIJ-35, C8E6, C10E6, C10E8, C12E6, C12E8 (Atlas G2127), C12E9, C12E10 (Brij 36T), C16E12, C16E21, cyclohexyl-*n*-ethyl-beta-D-maltoside, cyclohexyl-*n*-hexyl-beta-D-maltoside, cyclohexyl-*n*-methyl-beta-D-maltoside, *n*-decanoylsucrose, *n*-decyl-beta-D-glucopyranoside,*n*-decyl-beta-D-maltopyranoside, *n*-decyl-beta-D-thiomaltoside, *n*-dodecanoylsucrose, *n*-dodecyl-beta-D-glucopyranoside, *n*-dodecyl-beta-D-maltoside, genapol C-100, genapol X-80, genapol X-100, HECAMEG, heptane-1,2,3-triol, *n*-heptyl-beta-D-glucopyranoside, *n*-heptyl-beta-D-thioglucopyranoside, LUBROL PX, MEGA-8 (ocatanoyl-N-methylglucamide), MEGA-9 (nonanoyl-N-methylglucamide), MEGA-10 (decanoyl-N-methylglucamide), *n*-nonyl-beta-D-glucopyranoside, Nonidet P-10 (NP-10), Nonidet P-40 (NP-40), *n*-octanoyl-beta-D-glucoslyamine (NOGA), *n*-octanoylsucrose, *n*-octyl-*alpha*-D-glucopyranoside,*n*-octyl-beta-D- glucopyranoside, *n*-octyl-beta-D-maltopyranoside, PLURONIC F-68, PLURONIC F-127, THESIT, TRITON X-100 (*tert*-C8-Ø-E9.6;like NP-40), TRITON X-100 hydrogenated, TRITON X-114 (*tert*-C8-Ø-E7-8), TWEEN 20 (C12-sorbitan-E20;Polysorbate 20), TWEEN 40 (C16-sorbitan-E20), TWEEN 60 (C18-sorbitan-E20), TWEEN 80 (C18:1-sorbitan-E20), *n*-undecyl-beta-D-maltoside, cetearyl alcohol, hydrogenated tallow alcohol, lanolin alcohols, palmamide, peanutamide MIPA, PEG-50 tallow amide, cocamidopropylamine oxide, lauramine oxide, PEG-8 dilaurate, PEG-8 laurate, PEG-4 caster oil, PEG-120 glyceryl stearate, triolein PEG-6 esters, glycol stearate, propylene glycol ricinoleate, glyceryl myristate, glyceryl palmitate lactate, polyglyceryl-6 distearate, polyglyceryl-4 oleyl ether, methyl

gluceth-20 sesquistearate, sucrose distearate, polysorbate-60, sorbitan sequiisostearate, trideceth-3 phosphate, trioleth-8 phosphate, ceteareth–10, nonoxynol-9, PEG-20 lanolin, PPG-12-PEG-65 lanolin oil, dimethicone copolyol, meroxapol 314, poloxamer 122, PPG-5-ceteth-20 and lauryl glucose.

23. A method according to claim 21 wherein the surfactant is selected from the group of ionic surfactants consisting of: caprylic acid (n-octanoate), cetylpyridinium chloride, CTAB (Cetyltri-methylammonium bromide), cholic acid, decanesulfonic acid, deoxycholic acid, dodecyltrimethyl-ammonium bromide, glycocholic acid, glycodeoxycholic acid, lauroylsarcosine (sarkosyl), lithium n-dodecyl sulfate, lysophosphatidyl-choline, sodium n-dodecyl sulfate (SDS, lauryl sulfate), taurochenodeoxy- cholic acid, taurocholic acid, taurodehydrocholic acid, taurodeoxycholic acid, taurolithocholic acid, tauroursodeoxycholic acid, tetradecyltrimethyl- ammonium bromide (TDTAB), TOPPS, di-TEA-palmitoyl aspartate, sodium hydrogenated tallow glutamate, palmitoyl hydrolysed milk protein, sodium cocoyl hydrolysed soy protein, TEA-abietoyl hydrolysed collagen, TEA-cocoyl hydrolysed collagen, myristoyl sarcosine, TEA-lauroyl sarcosinate, sodium lauroyl taurate, sodium methyl cocoyl taurate, lauric acid, aluminium stearate, cottonseed acid, zinc undecylenate, calcium stearoyl lactylate, laureth-6 citrate, nonoxynol-8 carboxylic acid, sodium trideceth-13 carboxylate, DEA-oleth-10 phosphate, dilaureth-4 phosphate, lecithin, sodium cocoyl isethionate, sodium dodecylbenzene sulfonate, sodium cocomonoglyceride sulfonate, sodium C12-14 olefin sulfonate, sodium C12-15 pareth-15 sulfonate, sodium lauryl sulfoacetate, dioctyl sodium sulfosuccinate, disodium oleamido MEA-sulfosuccinate, ammonium laureth sulfate, sodium C12-13 pareth sulfate, MEA-lauryl sulfate, cocamidopropyl dimethylamine lactate, dimethyl lauramine,

soyamine, stearyl hydroxyethyl imidazoline, PEG-cocopolyamine, PEG-15 tallow amine, benzalkonium chloride, quaternium-63, oleyl betaine, sodium lauramidopropyl hydroxyphostaine, cetylpyridinium chloride, isostearyl ethylimidonium ethosulfate, cocamidopropyl ethyldimonium ethosulfate, hydroxyethyl cetyldimonium chloride, quaternium-18 and cocodimonium hydroxypropyl hydrolysed hair keratin.

24. A method according to claim 21 wherein the surfactant is selected from the group of zwitterionic surfactants consisting of: BigCHAP, CHAPS, CHAPSO, DDMAU, EMPIGEN BB (N-dodecyl- N,N-dimethylglycine), lauryldimethylamine oxide (LADAO, LDAO, Empigen OB), ZWITTERGENT 3-08, ZWITTERGENT 3-10, ZWITTERGENT 3-12 (3-dodecyl-dimethylammonio-propane-1-sulfonate), ZWITTERGENT 3-14, ZWITTERGENT 3-16, disodium cocoamphocarboxymethylhydroxy-propylsulfate, disodium cocoamphodipropionate, sodium cocoamphoacetate, sodium lauroampho PG-acetate phosphate, sodium tallow amphopropionate, sodium undecylenoamphopropionate, aminopropyl laurylglutamide, dihydroxyethyl soya glycinate and lauraminopropionic acid.

25. A method according to claim 21 wherein the surfactant is TRITON X-100 or TRITON-X114.

26. A method according to any one of claims 1 to 25 wherein the physical or chemical change is a change in temperature, pressure or exposure to a chemical compound.

27. A method according to any one of claims 1 to 25 wherein the physical change is a change in temperature.

28. A method according to any one of claims 1 to 25 wherein the chemical change is the addition of glycerol.

29. A method according to claim 4 wherein when the chemical reaction is a DNA sequencing or PCR reaction, the inert phase comprises mineral oil and the surfactant is TRITON X-100 or TRITON-X114.

30. A method according to any one of claims 1 to 29 wherein the ratio of the aqueous to inert phase is in the range of 1:4 to 1:19.

31. A method according to any one of claims 1 to 30 wherein the inert phase is removed from the substantially continuous aqueous phase after the chemical reaction has taken place.

32. A method according to claim 31 wherein the inert phase is removed from the substantially continuous aqueous phase by suction or evaporation.

33. A method according to any one of claims 3 to 12 wherein the aqueous phase and the inert phase are submitted to the reaction conditions together.

34. A method of performing a chemical reaction between at least two reactants in an aqueous solution comprising:

(a) combining a first emulsion in which an aqueous solution comprising a first reactant is emulsified in a first inert phase, with a second emulsion in which an aqueous solution comprising a second reactant is emulsified in a second inert phase;

(b) subjecting the mixture to a physical or chemical change such that the emulsions collapse and the emulsified aqueous solution coalesces into a substantially single or substantially continuous aqueous phase;

(c) subjecting the aqueous phase to conditions in which the chemical reaction between the reactants takes place.

35. A method of performing a chemical reaction between reactants in an organic phase comprising:

(a) subjecting an emulsion comprising

(i) a discontinuous organic phase in which at least one of the reactants is present; and

(ii) a continuous aqueous phase,

to a physical or chemical change such that a substantially continuous organic phase is formed; and

(b) providing conditions in which the chemical reaction between the reactants takes place.

36. A method of performing a chemical reaction between at least two reactants in an organic solution comprising:

(a) combining a first emulsion in which an organic solution comprising a first reactant is emulsified in a first aqueous phase, with a second emulsion in which an organic solution comprising a second reactant is emulsified in a second aqueous phase;

(b) subjecting the mixture to a physical or chemical change such that the emulsions collapse and the emulsified organic solution coalesces into a substantially single or substantially continuous organic phase;

(c) subjecting the organic phase to conditions in which the chemical reaction between the reactants takes place.